

REMARKS

Claims 17, 18, 20-22 and 24-31 are pending.

Claims 17, 18, 20-22 and 24-31 stand rejected.

Claims 17, 24, 30 and 31 have been amended. Support for these amendments can be found throughout the specification and drawings, as originally filed.

This response is submitted in response to a final office action and is deemed to place the application in a condition for allowance, or alternatively, in better condition for appeal.

35 USC §112, FIRST PARAGRAPH REJECTION

Claims 17, 18, 20-22, and 24-31 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

The Applicant respectfully traverses the 35 U.S.C. §112, first paragraph, rejection of claims 17, 18, 20-22 and 24-31.

In the interests of expediting prosecution of the instant application, and without admission that any amendment is required, the Applicants have amended claims 17, 24, 30 and 31 to remove the term “any” with respect to the recitation of the phrase “aircraft additional forces and moments.”

The Applicant submits that the 35 U.S.C. §112, first paragraph, rejection of claims 17, 18, 20-22 and 24-31 has been overcome or rendered moot.

35 USC §112, SECOND PARAGRAPH REJECTION

Claim 31 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention.

The Applicant respectfully traverses the 35 U.S.C. §112, second paragraph, rejection of claim 31.

In the interests of expediting prosecution of the instant application, and without admission that any amendment is required, the Applicants have amended claim 31 to substitute the term “the” with the term “a” with respect to the recitation of the phrase “nulling event.”

The Applicant submits that the 35 U.S.C. §112, second paragraph, rejection of claim 31 has been overcome or rendered moot.

35 USC §103(a) REJECTION

Claims 17, 18, 20-22 and 24-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over “Microsoft Flight Simulator Handbook” (denoted hereinafter as Stern) in view of “S-Wake Assessment of Wake Vortex Safety” (denoted hereinafter as NLR) and “A Piloted Simulation Study of Wake Turbulence on Final Approach” (denoted hereinafter as NASA).

The Applicant respectfully traverses the 35 U.S.C. §103(a) rejection of claims 17, 18, 20-22 and 24-31.

The standard for obviousness is that there must be some suggestion, either in the reference or in the relevant art, of how to modify what is disclosed to arrive at the claimed invention. In addition, “[s]omething in the prior art as a whole must suggest the desirability and, thus, the obviousness, of making” the modification to the art suggested by the Examiner. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1051, 5 U.S.P.Q.2d (BNA) 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988). Although the Examiner may suggest the teachings of a primary reference could be modified to arrive at the claimed subject matter, the modification

is not obvious unless the prior art also suggests the desirability of such modification. *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d (BNA) 1397, 1398 (Fed. Cir. 1989). There must be a teaching in the prior art for the proposed combination or modification to be proper. *In re Newell*, 891 F.2d 899, 13 U.S.P.Q.2d (BNA) 1248 (Fed. Cir. 1989). If the prior art fails to provide this necessary teaching, suggestion, or incentive supporting the Examiner's suggested modification, the rejection based upon this suggested modification is error and must be reversed. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d (BNA) 1566 (Fed. Cir. 1990).

The law is also clear that a claim in dependent form shall be construed to incorporate all the limitations of the claim to which it refers. 35 U.S.C. 112, fourth paragraph.

In the interests of expediting prosecution of the instant application, and without admission that any amendment is required, the Applicants have amended claim 17 to recite, among other things, a flight simulator system for training pilots under wake vortex danger conditions, comprising:

- a module (1) for control of the simulator modes is capable of choosing a training scenario and controlling operation of a plurality of simulator modules;

- a training scenarios database module (2);

- a module (3) for commutation of the simulator modules;

- a module (4) for imitation of an outside visual situation, a visual part of the air space and a ground surface in real time;

- a module (6) for simulation of a pilot workplace;

- a module (5) for simulation of an aviation instrument panel with an indication of a plurality of aircraft engine modes;

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems;

a module (7) for simulation of a plurality of ambient parameters;

a module (9) for simulation of a wake vortex situation caused by an aircraft is capable of determining a vortex generator wake vortex path as a set of the vorticity region centers and intensity on the basis of information from the training scenarios database module (2) and information from the module (7) for simulation of the ambient parameters;

a module (10) for simulation of wake vortex perturbation effects on the aircraft is capable of evaluation of aircraft additional forces and moments induced by the vortex generator wake vortices on the basis of information on the wake vortex path and intensity received from the module (9) for simulation of the wake vortex situation, information on the aircraft parameters received from the training scenarios database module (2), and information on aircraft position, flight velocity, angular rates, and geometrical characteristics received from a module (11) for simulation of the aircraft dynamics;

wherein the module (11) for simulation of the aircraft dynamics is capable of forming signals imitating the aircraft forces and moments according to the training scenario, as well as additional forces and moments induced by the vortex generator wake vortices, and transmitting the signals to the module (6) for simulation of the pilot workplace, module (5) for simulation of the aviation instrument panel, and module (4) for imitation of outside visual situation on the basis of information from the module (10) for simulation of wake vortex perturbation effects on the aircraft, from the training scenarios database module (2), and from the module (8) for simulation of the controls for the aircraft units and systems;

a system for evaluation of the pilot actions is capable of estimating correctness of the pilot actions against the flight situation hazardous for the aircraft on the basis of information received from the module (4) for imitation of an outside visual situation and the module (5) for simulation of the instrument panel; and

a module of visualization including a visualization device is capable of forming the image at least of an area of the aircraft forecasted positions and wake vortex danger areas on the basis of information received from a warning module;

wherein the image of the area of the aircraft forecasted positions is represented by a first geometric shape;

wherein the image of the wake vortex danger areas is represented by a second geometric shape;

wherein when the first and second geometric shapes intersect, a warning is issued by the warning module.

In the interests of expediting prosecution of the instant application, and without admission that any amendment is required, the Applicants have amended claim 24 to recite, among other things, a flight simulator system for training pilots under the conditions when the pilots receive information on a forecasted possibility of an aircraft encounter with a vortex generator wake vortex danger area and additionally, the flight simulator system, comprising:

a module (1) for control of the simulator modes is capable of choosing a training scenario and controlling operation of a plurality of simulator modules;

a training scenarios database module (2);

a module (3) for commutation of the simulator modules;

a module (4) for imitation of an outside visual situation, visual part of the air space and ground surface in real time;

a module (6) for simulation of the pilot workplace;

a module (5) for simulation of an aviation instrument panel with an indication of a plurality of aircraft engine modes;

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems;

a module (7) for simulation of a plurality of ambient parameters;

a module (9) for simulation of a wake vortex situation caused by an aircraft is capable of determining a vortex generator wake vortex path as a set of the vorticity region centers and intensity on the basis of information from the training scenarios database module (2) and information from the module (7) for simulation of the ambient parameters;

a module (10) for simulation of wake vortex perturbation effects on the aircraft is capable of evaluation of aircraft additional forces and moments induced by the vortex generator wake vortices on the basis of information on the wake vortex path and intensity received from the module (9) for simulation of the wake vortex situation, information on the aircraft parameters received from the training scenarios database module (2), and information on aircraft position, flight velocity, angular rates, and geometrical characteristics received from a module (11) for simulation of the aircraft dynamics;

wherein the module (11) for simulation of the aircraft dynamics is capable of forming signals imitating the aircraft forces and moments according to the training scenario, as well as additional forces and moments induced by the vortex generator wake vortices, and transmitting the signals to the module (6) for simulation of the pilot workplace, module (5) for simulation of

the aviation instrument panel, and module (4) for imitation of outside visual situation on the basis of information from the module (10) for simulation of wake vortex perturbation effects on the aircraft, from the training scenarios database module (2), and from the module (8) for simulation of the controls for the aircraft units and systems;

a system for evaluation of pilot actions is capable of estimating correctness of the pilot actions against the flight situation hazardous for the aircraft on the basis of information received from the module (4) for imitation of outside visual situation and the module (5) for simulation of the instrument panel;

a module (17) of parameters of the vortex perturbation danger area, comprising:

a unit (20) for evaluation of perturbation hazard is capable of estimating a perturbation hazard level at a given point according to a chosen hazard criteria for the aircraft additional aerodynamic forces and moments induced by the vortex perturbations on the basis of information received from the unit (16) for determination of the forces and moments, which belongs to the module (10) for simulation of wake vortex perturbation effects on the aircraft;

a unit (21) for determination of danger points where the additional forces and moments induced by the vortex perturbations are dangerous, the unit is capable of determining the coordinates of points belonging to the danger area according the hazard criteria based on information received from the unit (20) for evaluation of perturbation hazard;

a unit (22) for determination of a vortex perturbation danger area is capable of calculating the danger area geometrical characteristics on the basis of information received from the unit (21) for determination of danger points and transmitting the corresponding information; and

a warning module (18), comprising:

a unit (23) for selection of a delay time is capable of calculating the time period within which the aircraft has at least a possibility of a flight evasive maneuver providing evasion of the aircraft from the generator wake danger area after the signal warning against the possibility of wake encounter has been received;

a unit (24) for simulation of a control plane is capable of calculating the delay distance, which equals to the distance covered by the aircraft during the delay time, modeling the control plane situated in front of the aircraft perpendicular to its flight direction at the delay distance, and determining the forecasted time necessary for the aircraft to gain the control plane in the inertial frame;

a forecasting unit (25) is capable of determining a generator wake path in the form of the set of the generator vorticity region centers with respect to the inertial frame and of the intensity of the generator wake vortices at the forecasted time on the basis of information from the unit for simulation of wake vortices in the module for simulation of vortex situation;

a unit (26) for calculation of intersection points is capable of determining the coordinates of the intersection points of the generator wake vortex trajectory and the control plane at the forecasted time of the aircraft flight through it;

an areas and regions forming unit (27) is capable of forming around an intersection point of the wake vortex path and the control plane of the wake vortex danger area in the form of the set of the generator vorticity danger areas, where the entering aircraft may have the flight parameters exceeding the admissible limits, forming in the control plane of the area of the aircraft forecasted positions at the forecasted time of the aircraft intersection with the control plane with due regard to the flight regulations, forming around the region of the aircraft

forecasted positions of the alert area, the information on the entrance of the wake danger areas into the alert area will be provided to the user;

a transformation unit (28) is capable of calculating coordinates of the area of the aircraft forecasted positions, the alert area, and the wake vortex danger area in the aircraft frame;

a first intersection conditional test unit (29) is capable of calculating the distance from the alert area to the wake vortex danger area and marking its nulling;

a second intersection conditional test unit (30) is capable of calculating the distance from the area of the aircraft forecasted positions to the wake vortex danger area and marking its nulling;

an indication unit (31) containing at least one indication device is capable of indicating the nulling of the distance from the alert area to the generator wake vortex danger area;

an emergency indication unit (32) containing at least one indication device is capable of indicating the nulling of the distance from the area of the aircraft forecasted positions to the danger area of the generator wake vortices and the indication device is capable of indicating the nulling of the distance from the alert area to the generator wake vortex danger area and the indication device capable of indicating the nulling of the distance from the area of the aircraft forecasted positions to the danger area of the generator wake vortices are chosen from the group containing devices of visual, audio and tactile indication;

a module for simulation of noise, optical and dynamic effects; and

a module of visualization including a visualization device is capable of forming the image at least of the area of the aircraft forecasted positions and wake vortex danger areas on the basis of information received from the warning module;

wherein the image of the area of the aircraft forecasted positions is represented by a first geometric shape;

wherein the image of the wake vortex danger areas is represented by a second geometric shape;

wherein when the first and second geometric shapes intersect, a warning is issued by the warning module.

In the interests of expediting prosecution of the instant application, and without admission that any amendment is required, the Applicants have amended claim 30 to recite, among other things, a flight simulator system for training pilots under wake vortex danger conditions, comprising:

a module (1) for control of the simulator modes is capable of choosing a training scenario and controlling operation of a plurality of simulator modules;

a training scenarios database module (2);

a module (3) for commutation of the simulator modules;

a module (4) for imitation of an outside visual situation, a visual part of the air space and a ground surface in real time;

a module (6) for simulation of a pilot workplace;

a module (5) for simulation of an aviation instrument panel with indication of a plurality of aircraft engine modes;

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems;

a module (7) for simulation of a plurality of ambient parameters;

a module (9) for simulation of a wake vortex situation caused by an aircraft is capable of determining a vortex generator wake vortex path as a set of the vorticity region centers and intensity on the basis of information from the training scenarios database module (2) and information from the module (7) for simulation of the ambient parameters;

a module (10) for simulation of wake vortex perturbation effects on the aircraft is capable of evaluation of aircraft additional forces and moments induced by the vortex generator wake vortices on the basis of information on the wake vortex path and intensity received from the module (9) for simulation of the wake vortex situation, information on the aircraft parameters received from the training scenarios database module (2), and information on aircraft position, flight velocity, angular rates, and geometrical characteristics received from a module (11) for simulation of the aircraft dynamics;

wherein the module (11) for simulation of the aircraft dynamics is capable of forming signals imitating the aircraft forces and moments according to the training scenario, as well as additional forces and moments induced by the vortex generator wake vortices, and transmitting the signals to the module (6) for simulation of the pilot workplace, module (5) for simulation of the aviation instrument panel, and module (4) for imitation of outside visual situation on the basis of information from the module (10) for simulation of wake vortex perturbation effects on the aircraft, from the training scenarios database module (2), and from the module (8) for simulation of the controls for the aircraft units and systems;

a system for evaluation of the pilot actions is capable of estimating correctness of the pilot actions against the flight situation hazardous for the aircraft on the basis of information received from the module (4) for imitation of outside visual situation and the module (5) for simulation of the instrument panel;

a unit (13) for simulation of vortex generator dynamics including a vortex generator tracker is capable of receiving information on the vortex generator position, motion parameters, geometrical and weight characteristics from the scenarios database module (2) and a memory unit capable of storing information on the vortex generator position and motion parameters;

a unit (14) for simulation of wake vortices including a wake vortex tracker is capable of determining a vortex generator wake vortex path in the form of a set of the vorticity region center trajectories and intensity on the basis of information from the module (7) for simulation of the ambient parameters and module (13) for simulation of vortex generator dynamics, and also is capable of saving the information on coordinates of points of the vortex generator wake vortex path in the form of a set of the vorticity region center trajectories and intensity;

and the module (10) for simulation of wake vortex perturbation effects on the aircraft comprises:

a unit (15) for the aircraft schematization is capable of calculating a set of the aircraft geometrical characteristics necessary for calculation of the aircraft additional aerodynamic forces and moments induced by the vortex generator wake vortices on the basis of information on the aircraft type and configuration the training scenario database module (2);

a unit (16) for determination of the above mentioned forces and moments on the basis of information on the coordinates of points of the vortex generator wake vortex path in the form of the set of the vorticity region center trajectories and intensity saved by the unit (14) for simulation of wake vortices and of information on the aircraft position, flight velocity, angular rates, and geometrical characteristics received from the module (11) for simulation of the aircraft dynamics; and

a module of visualization including a visualization device is capable of forming the image at least of the area of the aircraft forecasted positions and wake vortex danger areas on the basis of information received from a warning module;

wherein the image of the area of the aircraft forecasted positions is represented by a first geometric shape;

wherein the image of the wake vortex danger areas is represented by a second geometric shape;

wherein when the first and second geometric shapes intersect, a warning is issued by the warning module.

In the interests of expediting prosecution of the instant application, and without admission that any amendment is required, the Applicants have amended claim 31 to recite, among other things, a flight simulator system for training pilots under wake vortex danger conditions, comprising:

a module (1) for control of the simulator modes is capable of choosing a training scenario and controlling operation of a plurality of simulator modules;

a training scenarios database module (2);

a module (3) for commutation of the simulator modules;

a module (4) for imitation of an outside visual situation, a visual part of the air space and a ground surface in real time;

a module (6) for simulation of a pilot workplace;

a module (5) for simulation of an aviation instrument panel with an indication of a plurality of aircraft engine modes;

a module (8) for simulation of a plurality of controls for a plurality of aircraft units and systems;

a module (7) for simulation of a plurality of ambient parameters;

a module (9) for simulation of a wake vortex situation caused by an aircraft is capable of determining a vortex generator wake vortex path as a set of the vorticity region centers and intensity on the basis of information from the training scenarios database module (2) and information from the module (7) for simulation of the ambient parameters;

a module (10) for simulation of wake vortex perturbation effects on the aircraft is capable of evaluation of aircraft additional forces and moments induced by the vortex generator wake vortices on the basis of information on the wake vortex path and intensity received from the module (9) for simulation of the wake vortex situation, information on the aircraft parameters received from the training scenarios database module (2), and information on aircraft position, flight velocity, angular rates, and geometrical characteristics received from a module (11) for simulation of the aircraft dynamics;

wherein the module (11) for simulation of the aircraft dynamics is capable of forming signals imitating the aircraft forces and moments according to the training scenario, as well as additional forces and moments induced by the vortex generator wake vortices, and transmitting the signals to the module (6) for simulation of the pilot workplace, module (5) for simulation of the aviation instrument panel, and module (4) for imitation of outside visual situation on the basis of information from the module (10) for simulation of wake vortex perturbation effects on the aircraft, from the training scenarios database module (2), and from the module (8) for simulation of the controls for the aircraft units and systems; and

a system for evaluation of the pilot actions is capable of estimating correctness of the pilot actions against the flight situation hazardous for the aircraft on the basis of information received from the module (4) for imitation of outside visual situation and the module (5) for simulation of the instrument panel;

a system (12) for estimation of the pilot actions comprises a memory device for saving information on the coordinates of the control plane, area of the aircraft forecasted positions and wake vortex danger areas of vortex generators located in the aircraft vicinity at least within the time of emergency indication of a nulling event for the distance from the area of the aircraft forecasted positions to the danger area of the vortex generator wake;

a module of visualization including a visualization device is capable of forming the image at least of the area of the aircraft forecasted positions and wake vortex danger areas on the basis of information received from a warning module;

wherein the image of the area of the aircraft forecasted positions is represented by a first geometric shape;

wherein the image of the wake vortex danger areas is represented by a second geometric shape;

wherein when the first and second geometric shapes intersect, a warning is issued by the warning module.

Neither Stern, NLR, and/or NASA, either alone or in combination therewith, disclose or suggest the invention as claimed in claims 17, 24, 30 or 31, as amended.

Specifically, neither Stern, NLR, and/or NASA, either alone or in combination therewith, disclose or suggest, among other things, a flight simulator system for training pilots under wake vortex danger conditions including a module of visualization including a visualization device

that is capable of forming the image at least of the area of the aircraft forecasted positions and wake vortex danger areas on the basis of information received from a warning module, wherein the image of the area of the aircraft forecasted positions is represented by a first geometric shape, wherein the image of the wake vortex danger areas is represented by a second geometric shape, wherein when the first and second geometric shapes intersect, a warning is issued by the warning module.

Because claim 17 is allowable over Stern, NLR, and/or NASA, either alone or in combination therewith, for at least the reasons stated above, claims 18 and 20-22, which depend from and further define claim 17, are likewise allowable. Because claim 24 is allowable over Stern, NLR, and/or NASA, either alone or in combination therewith, for at least the reasons stated above, claims 25-29, which depend from and further define claim 24, are likewise allowable.

The Applicant submits that the 35 USC §103(a) rejection of claims 17, 18, 20-22 and 24-31 has been overcome or rendered moot.

CONCLUSION

In view of the foregoing, the Applicant respectfully requests reconsideration and reexamination of the Application. The Applicant respectfully submits that each item raised by Examiner in the Final Office Action of May 31, 2011 has been successfully traversed, overcome or rendered moot by this response. The Applicant respectfully submits that each of the claims in this Application is in condition for allowance and such allowance is earnestly solicited.

The Examiner is invited to telephone the Applicant's undersigned attorney at (248) 601-6666 if any unresolved matters remain.

Respectfully submitted,

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